TITLE OF INVENTION: METHOD AND SYSTEM FOR ENHANCING A GRAPHIC OVERLAY ON A VIDEO IMAGE

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METHOD AND SYSTEM FOR ENHANCING
A GRAPHIC OVERLAY ON A VIDEO IMAGE

Field of the Invention

[0001]   The present invention relates generally to enhancement of graphic overlays on video images, and more specifically to enhancement of such overlays on video images such as television broadcasts of sporting events.

Background of the Invention

[0002]   Television broadcasts of sporting events present viewers with real-time, or in some cases videotaped or delayed, video images of the sporting event. Enhancements to such video images are known. For example, graphic overlays are often provided by the broadcaster to provide information to the viewer that is not readily ascertainable from merely viewing the currently displayed video image of the sporting event.

[0003]   Figure 1 shows a depiction of a prior art graphic overlay provided with a broadcast video image of a sporting event, in this case, a major league baseball game. As shown in Figure 1, a video image 12 of activity occurring in the baseball game is broadcast to a television monitor or receiver providing a viewing screen 14. As used herein, "broadcast" is meant to include any means of providing the video image and overlay to the viewer, for example, by conventional through-the-air broadcasting, by cable, or by videotape or other delayed means.

[0004]   A graphic overlay 16 is provided within the confines of the viewing screen 14, overlying the video image 12. Typically, the graphic overlay 16 occupies only a small portion of the viewing screen 14 so that the graphic overlay can be displayed without significantly interfering with the viewer's ability to view the video image 12. As shown in Figure 1, the video image 12 is that of a baseball player batting. Accordingly, the information provided by the graphic overlay 16 may be viewed concurrently by the viewer while the video image is being viewed.

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[0005]   The graphic overlay 16 provides information to the viewer that is not readily ascertainable from viewing the video image 12 of the activity occurring in the baseball game. For example, the graphic overlay in Figure 1 identifies the competing teams 18 (conventionally the home team is listed below the visiting team); the team that is currently batting is identified by asterisk 20; the score 22; the pitch count 24; the number of outs 26; the inning 28; the identity of the broadcaster 30 providing the broadcast; and the bases 32 currently occupied by base runners.

[0006]   As shown in Figure 1, the graphic overlay 16 shows that first and second bases on the field where the baseball game is being played are occupied by base runners, and third base is unoccupied. Indicia are provided at the locations of first and second base, and no indicia is provided at the location of third base. Alternatively, prior art graphic overlays show indicia at all three base locations, and use some means to alter (e.g., by color change) the bases that are occupied by base runners.

[0007]   One type of information that is notably missing from known graphic overlays such as overlay 16 is the identity of the base runners currently occupying the bases on the field where the baseball game is being played. For example, the graphic overlay 16 of Figure 1 does not provide the viewer with information that would identify the base runners on first and second base. Such information is important to a viewer, as some base runners can typically score from second base on a routine single base hit to the outfield while other base runners typically cannot. Base runner identity information would add to the viewing enjoyment of the game for a viewer.

[0008]   Thus, it is an object of the present invention to provide a method and system for enhancing graphic overlays on video images, and more specifically to enhancement of such overlays on video images such as television broadcasts of sporting events. It is a further object of the present invention to provide such a method and system for enhancing a graphic overlay, to a video image of a baseball game, in order to provide information relating to the identity of base runners currently occupying the bases in the baseball game.

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Summary of the Invention

[0009]   A method and system for broadcasting activity occurring in a baseball game is provided, wherein the activity includes one or more base runners occupying bases in a field where the baseball game is being played. The method comprises the steps of (i) providing a video image of activity occurring in the baseball game; (ii) creating a graphic overlay for the video image, wherein the graphic overlay provides indicia representing identity information of the one or more base runners occupying bases; and (iii) overlying the graphic overlay over the video image to create a combined image comprising the graphic overlay and the video image. The indicia representing identity information of the one or more base runners occupying bases is provided in the form of uniform numbers of the base runners. In one embodiment, the system includes a video image source for generating a video image signal, a graphic overlay generator for generating a video graphic signal, and a signal mixer for mixing the video image signal and the video graphic signal to output a mixed video signal capable of being broadcast to a viewing screen.

Brief Description of the Drawings

[0010]   Figure 1 is a depiction of a prior art graphic overlay provided together with a video image of a sporting event;

[0011]   Figure 2 is a depiction of an enhanced graphic overlay, generated according to the present invention, provided together with a video image of a sporting event;

[0012]   Figure 3 is an expanded view of the enhanced graphic overlay of Figure 2, showing more clearly the enhancement provided by the present invention;

[0013]   Figure 4 is a block diagram of a system used to provide the enhanced graphic overlay and video image shown in Figure 2;

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[0014] Figure 5 is a block diagram of the graphic overlay generator shown in the system of Figure 4; and

[0015] Figure 6 is a block diagram of the graphic overlay memory used in the graphic overlay generator of Figure 5.

Detailed Description of a Preferred Embodiment of the Invention

[0016] Referring now to Figure 2, an enhanced graphic overlay 36 is provided for a video image 12 of activity occurring in a baseball game. The video image 12 and graphic overlay 36 are broadcast to a television monitor or receiver providing a viewing screen 14. The video image 12 may be a real-time image of activity as it occurs in the game, or it may be a videotaped or otherwise time delayed broadcast.

[0017] The enhanced graphic overlay 36 provides information to the viewer that may not be readily ascertainable from viewing the video image 12 of the activity occurring in the baseball game, and preferably occupies only a minor portion (*i.e.*, less than 20%) of the video image. The enhanced graphic overlay 36 provides some information that is similar to that provided by the prior art graphic overlay 16 of Figure 1. For example, the enhanced graphic overlay 36 identifies the competing teams 38 (conventionally the home team is listed under the away team); the team that is currently batting is identified by asterisk 40; the score 42; the pitch count 44; the number of outs 46; the inning 48; and the identity of the broadcaster 50.

[0018] As used herein, the term "graphic overlay" shall mean any indicia that is overlaid upon or provided together with a video image that is not purely textual in nature. For example, both the prior art graphic overlay 16 of Figure 1, and the enhanced graphic overlay 36 of Figures 2 and 3 include, among other things, an outlined border for the overlay, and a graphic representation of a baseball diamond, *i.e.*, graphically showing the baseball diamond and/or the bases forming the infield.

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[0019]   Also like the prior art graphic overlay 16 of Figure 1, the inventive graphic overlay 36 provides information showing the bases 52 that are currently occupied by base runners.   As shown in Figure 2, the graphic overlay 36 shows that first and second base are occupied by base runners, and that third base is unoccupied. As shown in Figure 3, first base is identified by 52a and second base is identified by 52b. No base runner presently occupies third base 52c.

[0020]   Unlike the prior art graphic overlay 16 of Figure 1, the inventive graphic overlay 36 also provides information or indicia relating to the identity of the base runners currently occupying the occupied bases 52a and 52b. In one embodiment, as shown in Figures 2 and 3, the identity information provided are the uniform numbers of the base runners occupying the occupied bases 52a and 52b. As shown, the player assigned uniform number 8 is presently occupying first base 52a, and the player assigned uniform number 41 is presently occupying second base 52b.

[0021]   Other indicia relating to the identity of the base runners currently occupying the occupied bases 52 is contemplated by the present invention. For example, photos or images of the base runners faces can be provided at the locations of occupied bases 52a and 52b. Of course, the expected size of the viewer's screen 14 may influence the detail that might be provided by such photographs or other indicia.

[0022]   Systems for generating video images and for creating graphic overlays for the video images, such as those shown in Figure 1, are known in the art. Two such systems are shown in U.S. Patent Nos. 4,580,165 and 5,883,610, which are incorporated herein as if they had been fully set forth. Such systems may be used, together with the inventive features of the present invention, to create the graphic overlay in Figure 3, and the combined video image and graphic overlay shown in Figure 2.   Figures 4 through 6, descriptions of which follow, provide the functional block diagrams of such a system for use in generating the graphic overlay and the combined video image and graphic overlay shown in Figures 2 and 3.

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[0023]   Figure 4 shows a system 60, used to provide the enhanced graphic overlay 36, as shown alone in Figure 3, and the combine video image and graphic overlay shown in Figure 2. The system 60 comprises a video image source 62, a graphic overlay generator 64, a video mixer 66 for overlaying the enhanced graphic overlay 36 onto the video image 12 (or for combining the graphic overlay 36 and the video image12), and a video display monitor 68. The video display monitor 68 provides the viewing screen 14 shown in Figure 2.

[0024]   The video image source 62 may be a video camera, for providing a live (real-time) image of a sporting event such as a baseball game, or may be some other type of source of a video signal, such as a videotape or digital video disc (DVD) player. The video image source 62 outputs a video image signal 70 to the video mixer 66. The video image signal 70 represents the video image 12 shown in Figure 2.

[0025]   The graphic overlay generator 64 (shown in greater detail in Figures 5 and 6), outputs a video graphics signal 72 to the video mixer 66. The video graphics signal 72 represents the enhanced graphic overlay 36 in Figure 2. The video graphics signal 72 includes information required to generate the enhanced graphic overlay 36, including information related to the identity of base runners occupying bases 52. The video mixer 66 receives the video image signal 70 and the video graphics signal 72 and outputs a combined or mixed video signal 74 to the video display monitor 68.

[0026]   The video mixer 66 includes at least a frame memory 76 for storing the video image signal 70 and outputting a stored video image signal 80. A look-up table 78 receives the stored video image signal 80 and the video graphics signal 72, overlays the video graphics signal onto the stored video image signal 80, and outputs the mixed video signal 74 to the video display monitor 68. Alternatively, the video mixer 66 may be constructed by any means known in the art that will enable the video graphics signal 72 to be overlaid onto the video image signal 70, and the output mixed video signal 74 to be provided to the video display monitor 68.

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[0027]   If the video mixer 66 shown in Figure 4 is utilized in practicing the present invention, a video address generator 82 is used to generate addresses, and to provide these addresses to both the graphic overlay generator 64 and the frame memory 76, via video address signal 84. The video address signal 84 designates a location in frame memory 76 (or graphic overlay memory 88 described below) which the video data (or graphic overlay data) is to be read from or stored in. The frame memory 76 may be configured to perform reading and storing operations simultaneously using a dual port random access memory (RAM) device. The video address generator 82 may also provide information related to the position that the enhanced graphic overlay 36 should be overlaid upon the video image 12.

[0028]   Figure 5 shows in greater detail one embodiment of the graphic overlay generator 64 shown in the system of Figure 4. It is contemplated, however, that the graphic overlay generator 64 may be constructed by any means known in the art that will enable the generation and output of video graphic signal 72 to the video mixer 66. As shown in Figure 5, the graphic overlay generator 64 comprises a central processing unit or CPU 86 and a graphic overlay memory 88. The video address signal 84 is provided to the graphic overlay memory 88 by the video address generator 82. Also provided to the graphic overlay memory 88 are a graphics address signal 90, a select control signal 92, and a graphics data signal 94, all three of these signals being provided by the CPU 86. Alternatively, the graphics data signal may be provided by an external source (not shown).

[0029]   The graphics address signal 90 designates a location in the graphic overlay memory 88 at which the graphics data is to be stored in or retrieved from. The graphic overlay memory 88 may be configured to perform reading and storing operations simultaneously using a dual port random access memory (RAM) device. The select control signal 92 controls the storing and reading operations of the graphic overlay memory 88. The graphics data signal 94 represents data that in part forms the video graphics signal 72. Video graphics

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signal 72 is output by the graphic overlay memory 88 and provided to the look-up table 78 in the video mixer 66. Referring back to Figure 4, the look-up table 78 outputs the mixed video signal 74 obtained from overlaying the video graphics signal 72 from the graphic overlay generator 64 and the stored video image signal 80 from frame memory 76.

[0030]   Figure 6 shows in greater detail the graphic overlay memory 88 shown in the graphic overlay generator 64 of Figure 5. As shown in Figure 6, the graphic overlay memory 88 comprises a multiplexer 96, memory 98, first graphics data buffer 100, and second graphics data buffer 102. It is contemplated, however, that the graphic overlay memory 88 may be constructed by any means known in the art that will enable the generation and output of video graphic signal 72 to the video mixer 66.

[0031]   The multiplexer 96 receives the video address signal 84 and the graphics address signal 90, and outputs one of these two addresses depending upon the state of the select control signal 92 output by CPU 86. Memory 98 contains the graphics data (such as player identification information) which is read from or written to memory 98, depending upon the output of multiplexer 96. First graphics data buffer 100 buffers and outputs video graphic signal 72 from the memory 98 to look-up table 78. Second graphics data buffer 102 buffers and outputs graphics data signal 94 to the memory 98 from the CPU 86.

[0032]   The graphic overlay memory 88 of Figure 6 operates as follows. If the select control signal 92 output by CPU 86 is high (or one state), the multiplexer 96 outputs a video address provided by video address generator 82, and memory 98 outputs graphics data designated by the address to first data graphics buffer 100. The first data graphics buffer 100 buffers the graphics data and then outputs it to the look-up table 78. If, however, the select control signal 92 output by CPU 86 is low (or an opposite state), the multiplexer 96 outputs a graphics address provided by the CPU 86, and memory 98 stores graphics data transmitted from second data graphics buffer 102 in the location designated by the address, thereby renewing the contents of memory 98.

[0033]   Accordingly, a preferred embodiment of a method and system for enhancing graphic overlays on video images has been described. With the foregoing description in mind, however, it is understood that this description is made only by way of example, and that the invention is not limited to the particular embodiments described herein. For example, the system 60, shown and described in Figures 4-6 and used to provide the enhanced graphic overlay and video image shown in Figure 2, may be any number of known systems that are typically used to provide graphic overlay images on top of, or overlaid upon, video images. It is further understood that various rearrangements, modifications, and substitutions may be implemented with respect to the foregoing description without departing from the scope of the invention as defined by the following claims and their equivalents.